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FOREIGN AND DOMESTIC.

Observations on Quackery, &c. continued from the Medical Observer.

NO. II.

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"*By the King's Patent.*

"WHITEHEAD'S ESSENCE OF MUSTARD,

"*A safe and effectual remedy for rheumatisms, gout, rheumatic gout, sciatica, lumbago, numbness, palsy, flatulencies, head-ach, pains of the stomach, sprains, bruises, chilblains, &c. Prepared only, and sold wholesale and retail, by the inventor,* R. JOHNSON, *apothecary, Greek-street.*"

"IT is universally acknowledged (observes the proprietor), that mustard is a plant possessed of the most powerful

virtues; its reputation as a medicine for the rheumatism, gout, lumbago, and palsy, has been established for ages. Amidst an innumerable variety of remedies for these inveterate diseases, which have successively risen and fallen in public estimation, mustard has successfully stood the test of experience. But the faculty have ever observed, and the afflicted feelingly regretted, that the use of this invaluable medicine is, in all cases, attended with disagreeable circumstances." He further states, that " mustard is found, upon analysis, to be *clogged with so* many impurities, and its medicinal virtues so *widely* diffused, and *closely* united with the gross parts, that persons afflicted with the gout, rheumatism, &c. cannot take a dose *sufficiently* large, without nauseating the stomach, and, if externally applied, it irritates and inflames in a most violent manner; were it not for these causes, it is highly probable other remedies would have been unnecessary !!!"

" To render, therefore, so excellent a medicine universally beneficial, every inconvenience is entirely removed in WHITEHEAD'S ESSENCE OF MUSTARD. It is prepared in PILLS, and in a FLUID STATE, for the convenience of *external* and *internal* use, and is so perfectly innocent, that it may be used by persons of every age."

For this invaluable discovery, the proprietor, it appears, has obtained a PATENT, but on what grounds it could have been solicited or granted by the legislature, we cannot surmise. As this nostrum was first invented by Mr. Johnson, and still continued to be made by him, why it should be named Whitehead's, appears to us somewhat extraordinary. It seems to indicate that Mr. Johnson was at first ashamed to have his name affixed to it, from the consciousness of its neither deserving the title or character he has given it.

We do not find, on examination, that this valuable preparation is, from its composition, entitled to be termed an essence from mustard. It does not appear to us to be any more than diluted *spirit of turpentine*, to which we conceive Mr. Johnson's encomiums on the virtues of mustard are not strictly applicable, nor can we agree with him in pronouncing it a "*safe* and *effectual*" remedy for those complaints, for the cure of which he so warmly, but not disinterestedly recommends it. The expressed oil of mustard may have been employed to dilute the spirit of turpentine; but this oil does not contain the aromatic quality of the mustard in which its medicinal virtues reside. The oil is insipid, and by the manufactors of the flour of mustard is sold as cheap as common linseed oil.

This nostrum is coloured, probably, by some mustard seed being infused in it, but the menstruum is not capable of extracting its virtues in a degree to entitle it to the term of essence of mustard. A liniment with spirit of turpentine and camphor, was much employed by Dr. Lewen, in Liverpool; the formula for which is published in the *Pharmacopœia Chirurgica*, with an observation by the author of that very useful work, that it has been found to resemble, very CLOSELY, "Whitehead's Essence of Mustard." The taste of the turpentine is so very predominant, that we cannot discover the least flavour of camphor.

The author of a late spirited and well-written pamphlet* on quackery states, that it was his intention to have given the composition of the patent medicines, but, on showing them to

* This work is entitled an Essay on Quackery, and the dreadful consequences arising from taking advertised medicines, illustrated with remarks on the fatal effects, with an account of a recent death, occasioned by a quack medicine, and observations on the coroner's inquest taken on the body, &c.

an intelligent gentleman, he was assured that those taken from specifications in the patent-office were very erroneous, although given in with the *solemnity of an oath;* he therefore thought it more proper to abridge the number of the recipes, than deceive the public. His letter on the subject states as follows:

"Your recipes on specifications in the patent-office will assuredly err, for, although I believe each is given in with the *solemnity* of an oath, it is doubtful whether any one be true. No action for infringement will therefore lie; such, if instituted, must be on another principle, not on the patent, viz. for counterfeiting the proprietor's name, his bills, &c. and for selling a preparation as his, which is not so. The purport of a patent is, therefore, *merely parade!*" He further asserts, "that eminent and experienced chemists have proved the *impossibility* of combining the ingredients named in some of the specifications, and if they could, they were *diametrically opposite* to the purpose intended."

Dr. Walter Keighley, in his popular treatise on midwifery, and the management and diseases of children, observes, "the inventors of good medicines are, no doubt, entitled to compensation, but this is very improperly given by a *patent*, whereby the quack is enabled to conceal the composition of his nostrum (for no patient ever thinks to examine the specification of his patent), and what is more dangerous, to put it indiscriminately into the hands of the most ignorant, in every stage of a disease, or indeed for the cure of half the diseases attending the human frame." Page 352.

With respect to the composition of this pretended essence of mustard, we cannot discover the least pretension the proprietor has to a patent. Spirit of turpentine has been employed,

both externally and internally, in cases of chronic rheumatism, for upwards of a century; Mr. Johnson can, therefore, have no certain claim to its first recommendation in those cases. We can see but very little similiarity between the properties of mustard and turpentine, and in some cases where the former may be proper, the latter may prove highly injurious. Turpentine is likewise a strong diuretic, a property which cannot be attributed to mustard.

As a remedy for chilblains, diluted spirit of turpentine has been very commonly and successfully employed; but, in such cases, the stimulus of the mustard would be more likely to increase the inflammation, and thus produce considerable mischief: and we are persuaded, that if Mr. Johnson's nostrum had been a genuine essence of mustard, he would not have recommended it as a proper application for chilblains.

As an internal remedy, we conceive there is a very great difference between the stimulating properties of mustard and turpentine, in evidence of which, we shall quote the opinion of Dr. Reece*, whose popular works prove him to be a practitioner well versed in chemistry, and much devoted to the good of his country. This author observes, " diluted spirit of turpentine has been puffed off in the daily prints, under the name of *essence of mustard.* The stimulus of the mustard is of a peculiar nature, and very different to turpentine. If, therefore, a person that was desired to take the mustard seed by a physician, and he preferred the *essence of mustard*, from the assurance that it contained, in a pure and concentrated state, all the virtues of the mustard, which is stated to be the case, the most serious consequences might ensue, and, in a court of justice, a person so injured might recover heavy damages."

* Domestic Medical Guide. Page 366.

In treating on rheumatism, this author observes, " it is often extremely difficult to distinguish rheumatic pains from those produced by deep seated inflammation, and from such mistakes the most serious consequences often arise, particularly when situated in the loins or hip joint: the stimulating applications, as electricity, &c. employed for the cure of rheumatism, increasing the inflammation, and hastening the suppuration, which generally terminates fatally. Such errors have occurred even in regular practice, and, through the imprudent use of *quack medicines*, such terminations are not unfrequent. That formidable disease, the lumbar abscess, begins with pains in the loins similar to lumbago, and almost the only chance of recovery the patient has, is the prevention of suppuration, which the continued use of those stimulating remedies must destroy every hope of effecting." Every person that is acquainted with hospital practice must know the truth of these assertions.

The observations we have already made on the internal use of the *concentrated essence of ginger*, in cases of gout, rheumatism, and flatulency, equally apply to these medicines, and we are persuaded that no medical man in his senses would approve of its topical application to gout in the extremities; he must have better authority than Mr. Johnson's testimony to justify so bold a practice.

For the " *essence of mustard pill*," it does not appear that the proprietor has yet obtained a patent, and we can venture to state, that neither Mr. Johnson or Mr. Whitehead will ever be able to concentrate the medicinal virtues of the mustard, so that it may in proper doses be exhibited in a pilular form. After observing that Mr. Johnson, *alias* Mr. Whitehead, is the propri-

ctor of the "essence of horehound*," we judge any observations on his abilities as a chemist, as well as his medicines, equally superfluous. We conclude, therefore, our animadversions on these medicines, by recommending them to the attention of the College of Physicians, whose duty it unquestionably is to remonstrate with government on the impropriety of granting patents for medicines whose indiscriminate use must be attended with serious consequences, and particularly for remedies which can in no respect be entitled to such protection.

[To be continued.]

Analysis of Mineral Waters.

The following extract from Henry's Chemistry, on the subject of mineral waters, is introduced in conformity to the wishes of several gentlemen, in hopes the information contained will enable those physicians, in the vicinity of the various mineral springs throughout the United States, to make a complete analysis of them, for the benefit of the medical public. I shall not, therefore, apologize for the length of the extract, as it would have been improper to divide it. I shall be happy to have it in my power to give publicity to any remarks and observations connected with this subject. E.

The complete and accurate analysis of mineral waters, and of mineral bodies in general, is one of the most difficult subjects

* A person possessing a slight knowledge of chemistry, and the properties of the horehound, must know that there can be no such preparation extracted from this herb as an ESSENCE, or that its virtues can be so concentrated with a spirituous menstruum, that a tea-spoon should contain any thing like a dose. He may as well advertise an essence of cabbage.

of chemical manipulation, and requires a very extensive acquaintance with the properties and habitudes of a numerous class of substances. Long and attentive study of the science is therefore essential to qualify any one for undertaking exact and minute determinations of the proportion of the component parts of bodies. Such minuteness, however, is scarcely ever required in the experiments that are subservient to the ordinary purposes of life; a general knowledge of the composition of bodies being sufficient to assist in directing the most useful applications of them. I shall not attempt, therefore, to lay down rules for accurate analysis, but shall only describe such experiments as are suited to afford an insight into the kind, but not to decide the exact proportion of the constituent principles of natural waters, and of mineral substances in general.

Before proceeding, however, to the analysis of a water, it is proper to inquire into its natural history, and to examine attentively its physical characters. The nature of the strata, in the neighbourhood of the spring, will often furnish useful suggestions respecting the contents of the water; the period of the year should be stated at which the analysis was performed; and whether after a rainy or dry season. The temperature of the water must be carefully observed, as it issues from the spring; and the quantity inquired into, which it yields in a given time. The sensible qualities of taste, smell, degree of transparency, &c. are also best ascertained at the fountain head. The specific gravity of the water may be found by weighing a bottle, which is capable of containing a known weight of distilled water, at a certain temperature, filled with the water under examination, at the same temperature. It is proper, also, to examine, on the spot, the channel through which the water has flowed; to collect any deposit that may have been formed; and to investigate its nature.

The effects of heat on the water may be next tried. Many waters lose their transparency when their temperature is raised, and let fall a considerable deposit. The quality of this may, in some degree, be conjectured from its appearance. If its colour be brownish-yellow, it consists, either wholly or chiefly, of oxyde of iron; if white, or nearly white, it is composed principally of the earthy carbonates. A mineral water, containing iron, deposits that metal also, when exposed to the atmosphere; and a thin pellicle forms on its surface, whether stagnant in a natural reservoir, or collected in a separate vessel. By this exposure, iron may be sometimes discovered in a water, though not easily detected at first; because it becomes further oxydized, and more sensible to the action of tests. Sulphuretted hydrogenous waters exhibit a sediment, even when preserved in a well-closed vial; the hydrogen quitting the sulphur, which settles in the form of a white powder.

§ 1. *Examination of Mineral Waters by Re-agents.*

Water is never presented by nature in a state of complete purity. Even when collected as it descends in the form of rain, chemical tests detect in it a minute proportion of foreign ingredients. And when it has been absorbed by the earth, has traversed its different strata, and is returned to us by springs, it is found to have acquired various impregnations. The readiest method of judging of the contents of natural waters, is by applying what are termed tests, or re-agents; *i. e.* substances which, on being added to a water, exhibit, by the phenomena they produce, the nature of the saline, or other ingredients. For example, if, on adding infusion of litmus to any water, its colour is changed to red, we infer, that the water contains an uncombined acid: if this change ensues, even after the water

has been boiled, we judge that the acid is a fixed, and not a volatile one: and if, on adding the muriated barytes, a precipitate falls down, we safely conclude, that the peculiar acid, present in the water, is, either entirely or in part, the sulphuric acid. I shall first enumerate the tests generally employed in examining waters, and describe their application; and, afterwards, indicate by what particular tests the substances, generally found in waters, may be detected.

In many instances, however, a mineral water may contain a saline, or other ingredient, but in such small quantity as to escape discovery by tests. It is, therefore, advisable to apply the tests of fixed substances to the water, after reducing its bulk one-half, or more, by evaporation, as well as in its natural state.

The use of tests, or re-agents, has been employed by Mr. Kirwan to ascertain, by a careful examination of the precipitate, not only the *kind*, but the *quantity*, of the ingredients of mineral waters. This will be best understood from an example. It is an established fact, that 100 parts of crystallized muriate of soda, when completely decomposed by nitrate of silver, yield, as nearly as possible, 235 of precipitate. From the weight of the precipitate, separated by nitrate of silver from a given quantity of any water, it is therefore easy, when no other muriatic salt is present, to infer what quantity of muriate of soda was contained in the water; since every hundred grains of muriated silver indicate, pretty accurately, $42\frac{1}{2}$ of crystallized common salt. The same mode of estimation may be applied in various other instances; and the rule for each individual case is given by Mr. Kirwan, in part ii, chap. 2, of his "Essay on the Analysis of Mineral Waters."

In most instances, also, it will be found stated in the following description of the use of the various re-agents.

I. *Infusion of Litmus, Syrup of Violets, &c.*

The infusion of litmus is prepared by steeping this substance, first bruised in a mortar, and tied up in a thin rag, in distilled water, which extracts its blue colour.

If the colour of the infusion tends too much to purple, it may be amended by a drop or two of solution of pure ammonia; but of this no more must be added than is barely sufficient, lest the delicacy of the test should be impaired.

The syrup of violets is not easily obtained pure. The genuine syrup may be distinguished from the spurious, by a solution of corrosive sublimate, which changes the former to green, while it reddens the latter. When it can be procured genuine, it is an excellent test of acids, and may be employed in the same manner as the infusion of litmus.

Paper stained with the juice of the March violet, or with that of the scrapings of radishes, answers a similar purpose. In staining paper for the purposes of a test, it must be used unsized; or, if sized, it must previously be well washed with warm water; because the alum, which enters into the composition of the size, will otherwise change the vegetable colour to red.

In the Philosophical Magazine, vol. 1, p. 180, may be found some recipes for other test liquors, invented by Mr. Watt.

Infusion of litmus is a test of most uncombined acids.

1. If the infusion redden the unboiled, but not the boiled water, under examination; or if the red colour, occasioned by adding the infusion to a recent water, return to blue, on boiling, we may infer, that the acid is a volatile one, and most probably the carbonic acid. Sulphuretted hydrogen gas, dissolved in water, also reddens litmus, but not after boiling.

2. To ascertain whether the change be produced by carbonic acid or by sulphuretted hydrogen, when experiment shows that the reddening cause is volatile, add a little lime-water, or, in preference, barytic water. This, if carbonic acid be present, will occasion a precipitate, which will dissolve, with effervescence, on adding a little muriatic acid. Sulphuretted hydrogen may also be contained, along with carbonic acid, in the same water; which will be determined by the tests hereafter to be described.

3. Paper tinged with litmus is also reddened by the presence of carbonic acid, but regains its blue colour on drying. The mineral and fixed acids redden it permanently. That these acids, however, may produce their effect, it is necessary that they should be present in a sufficient proportion. (See Kirwan on Mineral Waters, p. 40.) The dark-blue paper, which is generally wrapped round loaves of refined sugar, is not discoloured by carbonic acid, or sulphuretted hydrogen, but only by the stronger acids.

II. *Infusion of Litmus reddened by Vinegar; Spirituous Tincture of Brazil-wood; Tincture of Turmeric, and Paper stained with each of these three Substances; Syrup of Violets.*

All these different tests have one and the same object.

1. Infusion of litmus reddened by vinegar, or litmus paper reddened by vinegar, has its blue colour restored by pure alkalies and pure earths, and by carbonated alkalies and earths.

2. Turmeric paper and tincture are changed to a reddish-brown by alkalies, whether pure or carbonated, and by pure earths, but not by carbonated earths.

3. The red infusion of brazil-wood, and paper stained with it, become blue by alkalies and earths, and even by the latter, when dissolved by an excess of carbonic aid. In the last-mentioned case, however, the change will either cease to appear, or will be much less remarkable, when the water has been boiled.

4. Syrup of violets, when pure, is, by the same causes, turned green*; as is also paper stained with the juice of the violet, or with the scrapings of radishes.

III. *Tincture of Galls.*

Tincture of galls is the test generally employed for discovering iron; with all the combinations of which it produces a black tinge, more or less intense according to the quantity of iron. The iron, however, in order to be detected by this test, must be in the sate of red oxide, or, if oxydized in a less degree, its effect will not be apparent, unless after standing some time in contact with the air. By applying this test before and after evaporation, or boiling, we may know whether the iron be held in solution by carbonic acid, or by a fixed acid: for,

* According to Mr. Accum, syrup of violets, which has lost its colour by keeping, may be restored by agitation, during a few minutes, in contact with oxygen gas.

1. If it produce its effect before the application of heat, and not afterward, carbonic acid is the solvent.

2. If after, as well as before, a mineral acid is the solvent.

3. If, by the boiling, a yellowish powder be precipitated, and yet galls continue to strike the water black, the iron, as often happens, is dissolved both by carbonic acid and by a fixed acid. A neat mode of applying the gall test was used by M. Klaproth, in his analysis of the Carlsbad water; a slice of the gall-nut was suspended by a silken thread in a large bottle of the recent water, and so small was the quantity of iron, that it could only be discovered in water fresh from the spring, by a slowly-formed and dark cloud surrounding the re-agent. (Klaproth, vol. i, p. 279.)

IV. *Sulphuric Acid.*

1. Sulphuric acid discovers, by a slight effervescence, the presence of carbonic acid, whether uncombined or united with alkalies or earths.

2. If lime be present, whether pure or uncombined, the addition of sulphuric acid occasions, after a few days, a white precipitate.

3. Barytes is precipitated instantly, in the form of a white powder.

4. Nitric and muriatic salts, in a dry state or dissolved in very little water, on adding sulphuric acid, and applying heat, are decomposed; and if a stopper, moistened with solution of pure ammonia, be held over the vessel, white clouds will appear.

For distinguishing whether nitric or muriatic acid be the cause of this appearance, rules will be given hereafter.

V. *Nitric and Nitrous Acids.*

These acids, if they occasion effervescence, give the same indications as the sulphuric. The nitrous acid has been recommended as a test distinguishing between hepatic waters that contain hydro-sulphuret of potash, and those that contain only sulphuretted hydrogen gas. In the former case, a precipitate ensues on adding nitrous acid, and a very fetid smell arises; in the latter, a slight cloudiness only appears, and the smell of the water becomes less disagreeable.

VI. *Oxalic Acid and Oxalates.*

This acid is a most delicate test of lime, which it separates from all its combinations.

1. If a water which is precipitated by oxalic acid, become milky on adding a watery solution of carbonic acid, or by blowing air through it from the lungs, by means of a quill or glass tube, we may infer, that pure lime (or barytes, which has never yet been found pure in waters) is present.

2. If the oxalic acid occasion a precipitate before, but not after boiling, the lime is dissolved by an excess of carbonic acid;

3. If after boiling, by a fixed acid. A considerable excess of any of the mineral acids, however, prevents the oxalic acid from occasioning a precipitate, even though lime be present; because some acids decompose the oxalic, and others, dissolving

the oxalate of lime, prevent it from appearing. (Vid. Kirwan on Waters, page 88.)

The oxalate of ammonia, or of potash, (which may easily be formed by saturating their respective carbonates with a solution of oxalic acid) are not liable to the above objection, and are preferable, as re-agents, to the uncombined acid. Yet even these oxalates fail to detect lime when supersaturated with muriatic or nitric acids; and, if such an excess be present, it must be saturated, before adding the test, with pure ammonia. A precipitation will then be produced.

The quantity of lime, contained in the precipitate, may be known, by first calcining it with access of air, which converts the oxalate into a carbonate; and by expelling, from this last, its carbonic acid, by calcination, with a strong heat, in a covered crucible. According to Dr. Marcet, 117 grains of sulphate of lime give 100 of oxalate of lime, dried at 160° Fahrenheit.

The fluate of ammonia, recommended by Scheele, I find to be a most delicate test of lime. It may be prepared by adding carbonate of ammonia to diluted fluoric acid, in a leaden vessel, observing that there be a small excess of acid.

VII. *Pure Alkalies and carbonated Alkalies.*

1. The pure fixed alkalies precipitate all earths and metals, whether dissolved by volatile or fixed menstrua, but only in certain states of dilution: for example, sulphate of alumine may be present in water, in the proportion of 4 grains to 500, without being discovered by pure fixed alkalies. As the alkalies precipitate so many substances, it is evident that they cannot afford any very precise information, when employed as re-agents. From

the colour of the precipitate, as it approaches to a pure white, or recedes from it, an experienced eye will judge, that the precipitated earth contains less or more of metallic admixture; and its precise composition must be ascertained by rules which will presently be given.

2. Pure fixed alkalies also decompose all salts with basis of ammonia, which becomes evident by its smell (except the salts are dissolved in much water), and also by the white fumes it exhibits when a stopper, moistened with muriatic acid, is brought near.

3. Carbonates of potash and of soda have similar effects.

4. Pure ammonia precipitates all earthy and metallic salts. Beside this property, it also imparts a deep blue colour to any liquid that contains copper or nickel in a state of solution.

5. Carbonate of ammonia has the same properties, except that it does not precipitate magnesia from its combinations. Hence, to ascertain whether this earth be present in any solution, add the carbonate of ammonia till no farther precipitation ensues; filter the liquor; raise it nearly to 212° Fahrenheit; and then add pure ammonia. If any precipitation now occurs, we may infer the presence of magnesia. It must be acknowledged, that zircon, yttria, and glucine, would escape discovery by this process; but they have never yet been found in mineral waters; and their presence can scarcely be expected.

VIII. *Lime-Water.*

1. Lime-water is applied to the purposes of a test, chiefly for detecting carbonic acid. Let any liquor, supposed to con-

tain this acid, be mixed with an equal bulk of lime-water. If carbonic acid be present, either free or combined, a precipitate will immediately appear, which, on adding a few drops of muriatic acid, will again be dissolved with effervescence.

2. Lime-water will also show the presence of corrosive sublimate, by a brick-dust coloured sediment. If arsenous acid (common arsenic) be contained in a liquid, lime-water, when added, will occasion a precipitate, consisting of lime and arsenous acid, which is very difficultly soluble in water. This precipitate, when mixed up with oil, and laid on hot coals, yields the well-known garlic smell of arsenic.

IX. *Pure Barytes, and its Solution in Water.*

1. A solution of pure barytes is even more effectual than lime-water in detecting the presence of carbonic acid, and is much more portable and convenient; since, from the crystals of this earth, the barytic solution may at any time be immediately prepared. In discovering carbonic acid, the solution of barytes is used similarly to lime-water; and, if this acid be present, gives, in like manner, a precipitate soluble with effervescence in dilute muriatic acid.

2. The barytic solution is also a most sensible test of sulphuric acid and its combinations, which it indicates by a precipitate not soluble in muriatic acid. Pure strontites has similar virtues as a test. The quantity of the precipitated substance, indicated by the weight of the precipitate, will be stated in No. XV.

X. *Metals.*

1. Of the metals, silver and mercury are tests of the pre-

sence of hydro-sulphurets, and of sulphuretted hydrogen gas. If a little quicksilver be put into a bottle containing water impregnated with either of these substances, its surface soon acquires a black film, and, on shaking the bottle, a blackish powder separates from it. Silver is speedily tarnished by the same cause.

2. The metals may be used also as tests of each other, on the principle of elective affinity. Thus, for example, a polished iron plate, immersed in a solution of sulphate of copper, soon acquires a coat of this metal; and the same in other similar examples.

XI. *Sulphate of Iron.*

This is the only one of the sulphates, except that of silver, applicable to the purposes of a test. When used with this view, it is generally employed for ascertaining the presence of oxygen gas, of which a natural water may contain a small quantity.

A water, suspected to contain this gas, may be mixed with a little recently dissolved sulphate of iron, and kept corked up, in a vial completely filled by the mixture. If an oxyde of iron be precipitated in the course of a few days, the water may be inferred to contain oxygen gas.

XII. *Sulphate, Nitrate, and Acetate of Silver.*

These solutions are all, in some measure, applicable to the same purpose.

1. They are peculiarly adapted to the discovery of muriatic acid and of muriates; for the silver, quitting its solvent, combines

with the muriatic acid, and forms a flaky precipitate, which, at first, is white, but, on exposure to the sun's light, acquires a blueish, and finally a black colour. This precipitate Dr. Black states to contain, in 1000 parts, as much muriatic acid as would form $425\frac{1}{2}$ of crystallized muriate of soda, which estimate scarcely differs at all from that of Klaproth. The same quantity of muriate of silver (1000 parts) indicates, according to Kirwan, $454\frac{3}{4}$ of muriate of potash. A precipitation, however, may arise from other causes, which it may be proper to state.

2. The solutions of silver in acids are precipitated by carbonated alkalies and earths. The agency of the alkalies and earths may be prevented, by previously saturating them with a few drops of the same acid in which the silver is dissolved.

3. The nitrate and acetate of silver are decomposed by the sulphuric and sulphurous acids; but this may be prevented by adding, previously, a few drops of nitrate or acetate of barytes, and, after allowing the precipitate to subside, the clear liquor may be decanted, and the solution of silver added. Should a precipitation now take place, the presence of muriatic acid, or some one of its combinations, may be suspected. To obviate uncertainty, whether a precipitation be owing to sulphuric or muriatic acid, a solution of sulphate of silver may be employed, which, when no uncombined alkali or earth is present, is affected only by the latter acid.

4. The solutions of silver are also precipitated by sulphuretted hydrogen, and by hydro-sulphurets; but the precipitate is then reddish, or brown, or black; or it may be, at first, white, and afterwards become speedily brown or black. It is soluble, in great part, in dilute nitrous acid, which is not the case if occasioned by muriatic or sulphuric acid.

5. The solutions of silver are precipitated by extractive matter; but, in this case, also, the precipitate has a dark colour, and is soluble in nitrous acid.

XIII. *Nitrate and Acetate of Lead.*

1. Acetate of lead, the most eligible of these two tests, is precipitated by sulphuric and muriatic acids; but, as of both these we have much better indicators, I do not enlarge on its application to this purpose.

2. The acetate is also a test of sulphuretted hydrogen and of hydro-sulphurets of alkalies, which occasion a black precipitate; and, if a paper, on which characters are traced with a solution of acetate of lead, be held over a portion of water containing sulphuretted hydrogen gas, they are soon rendered visible; especially when the water is a little warmed.

3. The acetate of lead is employed in the discovery of uncombined boracic acid, a very rare ingredient of waters. To ascertain whether this be present, some cautions are necessary. (a) The uncombined alkalies and earths (if any be suspected) must be saturated with acetic or acetous acid. (b) The sulphates must be decomposed by acetate or nitrate of barytes, and the muriates by acetate or nitrate of silver. The filtered liquor, if boracic acid be contained in it, will continue to give a precipitate, which is soluble in nitric acid of the specific gravity of 1.3.

XIV. *Nitrate of Mercury, prepared with and without Heat.*

This solution, differently prepared, is sometimes employed as a test. But, since other tests answer the same purposes more

effectually, it is unnecessary to describe the application of mercurial solutions. For the same reason, also, oxygenized muriate of mercury is of little use in discovering the ingredients of mineral waters.

XV. *Muriate, Nitrate, and Acetate of Barytes.*

1. These solutions are all most delicate tests of sulphuric acid and of its combinations, with which they give a white precipitate, insoluble in dilute muriatic acid. They are decomposed, however, by carbonates of alkali; but the precipitate occasioned by carbonates is soluble in dilute muriatic or nitric acid, with effervescence, and may even be prevented by adding, previously, a few drops of the same acid as that contained in the barytic salt, which is employed.

One hundred grains of dry sulphate of barytes contain (according to Klaproth, vol. i, p. 168) about 45½ of sulphuric acid of the specific gravity 1850; according to Clayfield (Nicholson's Journal, 4to, iii, 38) 33 of acid, of sp. gr. 2240; according to Thenard, after calcination, about 25; and, according to Mr. Kirwan, after ignition, 23.5 of real acid. The same chemist states, that 170 grains of ignited sulphate of barytes denote 100 of dried sulphate of soda; while 136.36 of the same substance indicate 100 of dry sulphate of potash; and 100 parts result from the precipitation of 52.11 of sulphate of magnesia.

From Klaproth's experiments, it appears that 1000 grains of sulphate of barytes indicate 595 of desiccated sulphate of soda, or 1416 of the crystallized salt. The same chemist has shown, that 100 grains of sulphate of barytes are produced by the precipitation of 71 grains of sulphate of lime.

2. Phosphoric salts occasion a precipitate also, which is soluble in muriatic acid without effervescence.

XVI. *Prussiates of Potash and of Lime.*

Of these two, the prussiate of potash is the most eligible. When pure, it does not speedily assume a blue colour on the addition of an acid, nor does it *immediately* precipitate muriated barytes.

Prussiate of potash is a very sensible test of iron, with the solutions of which in acids it produces a Prussian blue precipitate, in consequence of a double elective affinity. To render its effect more certain, however, it may be proper to add, previously, to any water suspected to contain iron, a little muriatic acid, with a view to the saturation of uncombined alkalies or earths, which, if present, prevent the detection of very minute quantities of iron.

1. If a water, after boiling and filtration, does not afford a blue precipitate, on the addition of prussiate of potash, the solvent of the iron may be inferred to be a volatile one, and probably the carbonic acid.

2. Should the precipitation ensue in the boiled water, the solvent is a fixed acid, the nature of which must be ascertained by other tests.

In using the Prussian test for the discovery of iron, considerable caution is necessary, in order to attain accurate results. The prussiate should, on all occasions, be previously crystallized; and the quantity of oxide of iron, essential to its consti-

tution, or at least an invariable accompaniment, should be previously ascertained in the following manner. Expose a known weight of the crystallized salt to a low red-heat in a silver crucible. After fusing and boiling up, it will become dry, and will then blacken. Let it cool; wash off the soluble part; collect the rest on a filter; dry it, and again calcine it with a little wax. Let it be again weighed, and the result will show the proportion of oxide of iron present in the salt which has been examined. This varies from 22 to 30 and upwards per cent. When the test is employed for discovering iron, let a known weight of the salt be dissolved in a given quantity of water; add the solution gradually, and observe how much is expended in effecting the precipitation. Before collecting the precipitate, warm the liquid, which generally throws down a further portion of Prussian blue. Let the whole be washed and dried, and then calcined with wax. From the weight of the oxide obtained, deduct that quantity, which, by the former experiment, is known to be present in the prussiate that has been added; and the remainder will denote the quantity of oxide of iron, present in the liquid which is under examination.

3. Besides iron, the prussiated alkalies also precipitate muriate of alumine. No conclusion, therefore, can be deduced, respecting the non-existence of muriate of alumine, from any process, in which the prussic test has previously been used. It will, therefore, be proper, if a salt of alumine be indicated by other tests, to examine the precipitate effected by prussiate of potash. This may be done by repeatedly boiling it to dryness with muriatic acid, which takes up the alumine, and leaves the prussiate of iron. From the muriatic solution, the alumine may be precipitated by a solution of carbonate of potash.

4. According to Klaproth (II, 55), solutions of yttria (which earth, however, is not likely to be present in any mineral water) afford with the prussian test, a white precipitate, passing to pearl-grey, which consists of prussiate of yttria. This precipitate disappears on adding an acid, and hence may be separated from prussiated iron. The same accurate chemist states, that the prussian test has no action on salts with base of glucine (ib.); but that it precipitates zircon from its solutions. (II, 214.)

The prussiated alkalies decompose, also, all metallic solutions, excepting those of gold, platina, iridium, rhodium, osmium, and antimony.

XVII. *Succinate of Soda and of Ammonia.*

1. The succinate of soda was first recommended by Gehlen, and afterwards employed by Klaproth (Contributions, II, 48), for the discovery and separation of iron. The salt, with base of ammonia, has also been used for a similar purpose by Dr. Marcet, physician to Guy's hospital, in a skilful analysis of the Brighton chalybeate, which is published in the new edition of Dr. Saunders's Treatise on Mineral Waters.

The succinic test is prepared by saturating carbonate of soda or ammonia with this acid, already described, Ch. XIX, Sect. 8. In applying the test, it is necessary not to use more than is sufficient for the purpose; because an excess of it redissolves the precipitate. The best mode of proceeding is to heat the solution containing iron, and to add gradually the solution of succinate, until it ceases to produce any effect. A brownish precipitate is obtained, consisting of succinate of iron. This, when calcined with a little wax, in a low red-heat,

gives an oxide of iron, containing about 70 per cent. of the metal. From Dr. Marcet's experiments, it appears, that 100 grains of iron, dissolved in sulphuric acid, then precipitated by the succinate test, and afterwards burned with wax, give 148 of oxide of iron; that is, 100 grains of the oxide indicate about $67\frac{1}{2}$ of metallic iron.

2. The succinates, however, it is stated by Dr. Marcet and Mr. Ekeberg, precipitate alumine, provided there be no considerable excess of acid in the aluminous salt. On magnesia it has no action, and, hence, may be successfully employed in the separation of these two earths. If 100 parts of octahedral crystals of alum be entirely decomposed by succinate of ammonia, they give precisely 12 parts of alumine, calcined in a dull red-heat. The succinate of ammonia, it is stated by Mr. Ekeberg (*Journ. des Mines*, No. 70), precipitates glucine; and the same test, according to Klaproth (II, 214), throws down zircon from its solutions.

XVIII. *Phosphate of Soda.*

An easy and valuable method of precipitating magnesia has been suggested by Dr. Wollaston. It is founded on the property which fully neutralized carbonate of ammonia possesses; first to dissolve the carbonate of magnesia, formed when it is added to the solution of a magnesian salt, and afterwards to yield the earth to phosphoric acid, with which, and ammonia, it forms a triple salt. For this purpose, a solution of carbonate of ammonia, prepared with a portion of that salt which has been exposed, spread on a paper, for a few hours to the air, is to be added to the solution of the magnesian salt sufficiently concentrated; or to a water suspected to contain magnesia, after being very much reduced by evaporation. No

precipitate will appear, till a solution of phosphate of soda is added, when an abundant one will fall down. Let this be dried in a temperature not exceeding 100° Fahrenheit. One hundred grains of it will indicate 19 of pure magnesia, or about 64 of muriate of magnesia.

XIX. *Muriate of Lime.*

Muriate of lime is principally of use in discovering the presence of alkaline carbonates, which, though they very rarely occur, have sometimes been found in mineral waters. Carbonate of potash exists in the waters of Aix-la-Chapelle; that of soda in the water of a few springs and lakes; and the ammoniacal carbonate was detected by Mr. Cavendish, in the waters of Rathbone-place. Of all the three carbonates, muriate of lime is a sufficient indicator; for those salts separate from it a carbonate of lime, soluble with effervescence in muriatic acid.

With respect to the discrimination of the different alkalies, potash may be detected by the nitro-muriate of platina, which distinctly and immediately precipitates that alkali and its compounds, and is not affected by soda. Carbonate of ammonia may be discovered by its smell; and by its precipitating a neutral salt of alumine, while it has no action apparently on magnesian salts.

To estimate the proportion of an alkaline carbonate present in any water, saturate with sulphuric acid, and note the weight of real acid which is required. Now, 100 grains of real sulphuric acid saturate 121.48 potash, and 78.32 soda.

XX. *Solution of Soap in Alcohol.*

This solution may be employed to ascertain the comparative hardness of waters. With distilled water it may be mixed, without any change ensuing; but if added to a hard water, it produces a milkiness, more considerable as the water is less pure; and, from the degree of this milkiness, an experienced eye will derive a tolerable indication of the quality of the water. This effect is owing to the alkali quitting the oil, whenever there is present in a water any substance, for which the alkali has a stronger affinity than it has for oil. Thus all uncombined acids, and all earthy and metallic salts, decompose soap, and occasion that property in waters which is termed hardness.

XXI. *Alcohol.*

Alcohol, when mixed with any water, in the proportion of about an equal bulk, precipitates all the salts which it is incapable of dissolving. (See Kirwan on Waters, p. 263.)

XXII. *Hydro-Sulphuret of Ammonia.*

This and other sulphurets, as well as water saturated with sulphuretted hydrogen, may be employed in detecting lead and arsenic; with the former of which they give a black, and with latter a yellowish, precipitate. As lead and arsenic, however, are never found in natural waters, I shall reserve, for another occasion, what I have to say of the application of these tests.

TABLE,

Showing the Substances that may be expected in Mineral Waters, and the Means of detecting them.

Acids in general. Infusion of litmus. Syrup of violets, I.

Acid, boracic. Acetate of lead, XIII. 3.

Acid, carbonic. Infusion of litmus, I. 1. 2. Lime water, VIII. 1. Barytic water, IX. 1.

Acid, muriatic. Nitrate and acetite of silver, XII.

Acid, nitric. Sulphuric acid, IV. 4.

Acid, phosphoric. Solutions of barytes, XV. 2.

Acid, sulphurous. By its smell, and destroying the colour of litmus, and of infusion of red roses: by the cessation of the smell a few hours after the addition of the black oxide of manganese.

Acid, sulphuric. Solution of pure barytes, IX. Barytic salts, XV. Acetite of lead, XII.

Alkalies in general. Vegetable colours, II. Muriate of lime, XIX.

Ammonia. By its smell, and tests, II.

Barytes and its compounds. By sulphuric acid, IV.

Carbonates in general. Effervesce on adding acids.

Earths dissolved by carbonic acid. By a precipitation on boiling; by pure alkalies, VII.

Iron dissolved by carbonic acid. Tincture of galls, III. 1. Prussiate of potash, XVI. 1. Succinate of ammonia, XVII.

Iron dissolved by sulphuric acid. Same tests, III. 3. XVI. 2. XVII.

Lime in a pure state. Water saturated with carbonic acid. Blowing air from the lungs. Oxalic acid, VI.

Lime dissolved by carbonic acid. Precipitation on boiling. Caustic alkalies, VII. Oxalic acid, VI.

Lime dissolved by sulphuric acid. Oxalate of ammonia, VI. Barytic solutions, IX. and XV.

Magnesia dissolved by carbonic acid. Precipitation on boiling; the precipitate soluble in dilute sulphuric acid.

Magnesia dissolved by other acids. Precipitated by pure ammonia, not by the carbonate, VII. 5. Phosphate of soda, XVII.

Muriates of alkalies. Solutions of silver, XII.

———— *of lime.* Solutions of silver, XII. Oxalic acid, and oxalate of ammonia, VI.

Sulphates in general. Barytic solutions, IX. and XV. Acetite of lead, XII.

Sulphate of alumine. Barytic solutions, IX. and XV. A precipitate by carbonate of ammonia not soluble in acetous acid, but soluble in pure fixed alkalies by boiling. Succinates, XVII. 2.

Sulphate of lime. Barytic solutions, IX. and XV. Oxalic acid, and oxalates, VI. A precipitate by alkalies not soluble in dilute sulphuric acid.

Sulphurets of alkalies. Polished metals, X. Smell on adding sulphuric or muriatic acid. Nitrous acid, V.

Sulphuretted hydrogen gas. By its smell. Infusion of litmus, I. Polished metals, X. Acetite of lead, XIII. 2*.

§ 2. *Analysis of Waters by Evaporation.*

The reader, who may wish for rules for the complete and accurate analysis of mineral waters, will find in almost every elementary work a chapter allotted to this subject. He may also consult Bergmann's Physical and Chemical Essays, Vol. I, Essay 2, and Kirwan's Essay on the Analysis of Mineral Waters, London, 1799. As this manual, however, may sometimes be employed as a travelling companion, and may attend the chemist where more bulky works cannot be had, it may be proper to state, briefly, the mode of analysing waters, by the more certain, but still not unobjectionable, mode of evaporation.

Before evaporation, however, the gaseous products of the water must be collected, which may be done by filling with it a

* The vapour of putrefying animal or vegetable matter dissolved in water, according to Klaproth, Vol. I, p. 590, often gives a deceptive indication of sulphuretted hydrogen.

large glass bottle, capable of holding about fifty cubical inches, and furnished with a ground stopper and bent tube. The bottle is to be placed, up to its neck, in a tin kettle filled with brine, which must be kept boiling for an hour or two, renewing, by fresh portions of hot water, what is lost by evaporation. The disengaged gas is conveyed, by the bent tube, into a graduated jar, filled with, and inverted in mercury, where its bulk is to be determined. On the first impression of the heat, however, the water will be expanded, and portions will continue to escape into the graduated jar, till the water has obtained its maximum of temperature. This must be suffered to escape, and its quantity be deducted from that of the water submitted to experiment.

In determining, with precision, the quantity of gas, it is necessary to attend to the state of the barometer and thermometer, and to other circumstances already enumerated, page 57. If a considerable proportion of gas be contained in a mineral water, the most commodious method of receiving it is into a small gazometer.

The gases, most commonly found in mineral waters, are *carbonic acid; sulphuretted hydrogen; azotic gas; oxygen gas;* and in the neighbourhood of volcanoes only *sulphurous acid gas.*

To determine the proportion of the gases, constituting any mixture obtained from a mineral water in the foregoing manner, the following experiments may be made. If the use of reagents has not detected the presence of sulphuretted hydrogen, and there is reason to believe, from the same evidence, that carbonic acid forms a part of the mixture, let a graduated tube be nearly filled with it over quicksilver. Pass up a small portion

of solution of potash, and agitate this in contact with the gas. The amount of the diminution will show how much carbonic acid has been absorbed; and, if the quantity submitted to experiment was an aliquot part of the whole gas obtained, it is easy to infer the total quantity present in the water. The unabsorbable residuum consists, most probably, of oxygen and azotic gases; and the proportion of these two is best learned by the use of Dr. Hope's eudiometer (see page 68).

If sulphuretted hydrogen be present, along with carbonic acid, the separation of these two is a problem of some difficulty. Mr. Kirwan recommends that a graduated glass vessel, completely filled with the mixture, be removed into a vessel containing nitrous acid. This instantly condenses the sulphuretted hydrogen, but not the carbonic acid gas. I apprehend, however, that a more eligible mode will be found to be, the condensation of the sulphuretted hydrogen by oxymuriatic acid gas (obtained from muriatic acid and hyper-oxymuriate of potash), adding the latter gas very cautiously, as long as it produces any condensation. Or, perhaps, a better plan of effecting the separation (which, however, I have not at present an opportunity of trying), will be the following: half-fill a graduated vial with the mixed carbonic acid and sulphuretted hydrogen gases, and expel the rest of the water by oxymuriatic acid gas. Let the mouth of the bottle be then closed with a well ground stopper, and let the mixture be kept twenty-four hours. Then withdraw the stopper under water, a quantity of which fluid will immediately rush in. Allow the bottle to stand half an hour without agitation. The redundant oxymuriatic acid gas will thus be absorbed; and very little of the carbonic acid will disappear. Supposing that, to 10 cubic inches of the mixed gases, 10 inches of oxymuriatic gas have been added, and that, after absorption by standing over water, 5 inches remain:

the result of this experiment shows, that the mixture consisted of equal parts of sulphuretted hydrogen and carbonic acid gases.

Whenever this complicated admixture of gases occurs, as in the case of the Harrowgate-water, it is advisable to operate separately on two portions of gas, with the view to determine, by the one, the quantity of carbonic acid and sulphuretted hydrogen; and that of azote and oxygen by the other. In the latter instance, remove both the absorbable gases by caustic potash; and examine the remainder in the manner already directed.

Azotic gas sometimes occurs in mineral waters, almost in an unmixed state. When this happens, the gas will be known by the characters already described as belonging to it, page 64. Sulphurous acid gas may be detected by its peculiar smell of burning brimstone, and by its discharging the colour of an infusion of roses, which has been reddened by the smallest quantity of any mineral acid adequate to the effect.

The vessels employed for EVAPORATION should be of such materials as are not likely to be acted on by the contents of the water. I prefer those of unglazed biscuit ware, made by Messrs. Wedgwoods; but, as their surface is not perfectly smooth, and the dry mass may adhere so strongly as not to be easily scraped off, the water, when reduced to about one-tenth or less, may be transferred, with any deposit that may have taken place, into a smaller vessel of glass. Here let it be evaporated to dryness.

(*a*) The dry mass, when collected and accurately weighed, is to be put into a bottle, and alcohol poured on it, to the depth of an inch. After having stood a few hours, and been occasion-

ally shaken, pour the whole on a filter, wash it with a little more alcohol, and dry and weigh the remainder.

(*b*) To the undissolved residue, add eight times its weight of cold distilled water; shake the mixture frequently; and, after some time, filter; ascertaining the loss of weight.

(*c*) Boil the residuum, for a quarter of an hour, in somewhat more than 500 times its weight of water, and afterwards filter.

(*d*) The residue, which must be dried and weighed, is no longer soluble in water or alcohol. If it has a brown colour, denoting the presence of iron, let it be moistened with water, and exposed to the sun's rays for some weeks.

I. The solution in alcohol (*a*) may contain one or all of the following salts: muriates of lime, magnesia, or barytes, or nitrates of the same earths. Sometimes, also, the alcohol may take up a sulphate of iron, in which the metal is highly oxydized, as will appear from its reddish-brown colour.

1. In order to discover the quality and quantity of the ingredients, evaporate to dryness; weigh the residuum; add above half its weight of strong sulphuric acid; and apply a moderate heat. The muriatic or nitric acid will be expelled, and will be known by the colour of their fumes; the former being white, and the latter orange-coloured.

2. To ascertain whether lime or magnesia be the basis of the salts, let the heat be continued till no more fumes arise, and let it then be raised, to expel the excess of sulphuric acid. To the dry mass, add twice its weight of distilled water. This will take up the sulphate of magnesia, and leave the sulphate of

lime. The two sulphates may be separately decomposed, by boiling with three or four times their weight of carbonate of potash. The carbonates of lime and magnesia, thus obtained, may be separately dissolved in muriatic acid, and evaporated. The weight of the dry salts will inform us how much of each the alcohol had taken up. Lime and magnesia may also be separated by the use of the phosphate of soda, applied in the manner already described in the preceding section.

The presence of barytes, which is very rarely to be expected, may be known by a precipitation ensuing on adding sulphuric acid to a portion of the alcoholic solution, which has been diluted with 50 or 60 times its bulk of pure water.

II. The watery solution (*b*) may contain a variety of salts, the accurate separation of which from each other is a problem of considerable difficulty.

1. The analysis of this solution may be attempted by crystallization. For this purpose, let one-half be evaporated by a very gentle heat, not exceeding 80° or 90°. Should any crystals appear on the surface of the solution, while hot, in the form of a pellicle, let them be separated and dried on bibulous paper. These are muriate of soda or common salt. The remaining solution, on cooling very gradually, will, perhaps, afford crystals distinguishable by their form and other qualities. When various salts, however, are contained in the same solution, it is extremely difficult to obtain them sufficiently distinct to ascertain their kind.

2. The nature of the saline contents must, therefore, be examined by tests or re-agents.

The presence of an uncombined alkali will be discovered by the stained papers (p. 311), and of acids by the tests (p. 309). The vegetable alkali, or potash, may be distinguished from the mineral, or soda, by saturation with sulphuric acid, and evaporation to dryness; the sulphate of soda being much more soluble than that of potash; or, by super-saturation, with the tartarous acid, which gives a soluble salt with soda, but not with potash. Muriate of platina, also, is an excellent test of potash and its combinations; for, with the smallest portion of this alkali, or any of its salts, it forms a distinct and immediate precipitate; while it is not at all affected by the mineral alkali or its compounds.

If neutral salts be present in the solution, we have to ascertain both the nature of the acid and of the basis. This may be done by attention to the rules already given for the application of tests, which it is unnecessary to repeat in this place.

III. The solution by boiling water, contains scarcely any thing besides sulphate of lime.

IV. The residuum (*d*) is to be digested in distilled vinegar, which takes up magnesia and lime, but leaves, undissolved, alumine and highly oxydized iron. Evaporate the solution to dryness. If it contain acetate of lime only, a substance will be obtained which does not attract moisture from the air; if magnesia be present, the mass will deliquiate. To separate the lime from the magnesia, proceed as in I.

The residue, insoluble in acetous acid, may contain alumine, iron, and silex. The two first may be dissolved by muriatic acid, from which the iron may be precipitated, first by prussiate of potash, and the alumine afterward by a fixed alkali.

Further Information Relative to the Decomposition of the Alkalies.

Mr. Davy, in the concluding lectures of his course at the Royal Institution, gave a distinct and very luminous exhibition of his grand discovery, the decomposition of the alkalies. His first experiments were with potash and soda, which in their dry state are non-conductors, but when moistened, they have the property of conducting electricity. In both instances he clearly produced metalline substances, by bringing them within the action of the voltaic battery. Oxygen was given out at the positive side of the battery, and at the negative little globules of the metallic base were instantly formed. The metalline bases of the alkalies he named POTASSIUM and SODAIUM, chusing the termination *um*, in compliance with the present nomenclature of metals, in order that they might agree with platin*um*, plumb*um*, &c. &c. These new metals, to appearance, are precisely like mercury, but very different from that metal in their various properties, which he enumerated and demonstrated to the satisfaction of every one present. He showed the great inflammability of the new metals, by touching them with the smallest quantity of water, when they instantly took fire. They are both malleable at the common temperature, and may be spread into very thin leaves on a plate of glass, by mere pressure. So great, however, is their attraction for the oxygen of the atmosphere, that they almost instantly became tarnished. Before the discovery of these new metals, only two bodies of this class, viz. iron and platinum, were capable of being welded, and that at a very great heat; whereas separate parts of the potassium and sodaium can be united readily at the common temperature of the atmosphere. The specific gravity of the potassium is to that of water as about six to ten; in the

case of sodaium, it is as ninety-three to one hundred. Mr. Davy showed, that the metals which he had spread on glass, were easily fusible again by the heat of a spirit lamp, by the application of which they almost instantly run into globules. The attraction of these new metals for oxygen, was shown by their burning at a red-heat, when the alkalies were again revived. In analysing them with great accuracy, he found the potash contained fourteen parts of oxygen, and eighty-four of metalline base, but the soda contained twenty parts of oxygen, to eighty of base. These metals, introduced into a jar of oxy-muriatic gas, spontaneously took fire, and the white fume collected on the glass was in the one case muriate of potash, in the other muriate of soda, or common culinary salt. Particles of the new metals, put into water, decomposed the water, and gave out a brilliant light. The water used was pure distilled water, which instantly after the decomposition of the metals, showed, by means of turmeric paper, that it was become highly alkaline. The same sort of action was exhibited by the nitric acid; and the potassium acted also on the sulphuric and other strong acids. Mr. Davy placed small particles of the metals on ice, and they immediately decomposed the water and gave out a bright light: alkali was likewise formed on the ice.

These metals unite with mercury and form solids: thus, one part of sodaium and three of mercury being mixed, the two fluids united in a state of solidity. Several other experiments were made, and the professor felt no hesitation in giving his opinion as to the great importance of these discoveries in their application to the arts; and even to an art, which he doubted if he should venture to mention, the art of war, as the destruction occasioned by these metals, if they could be brought into action, would be considerably greater than by those now in use.

In reference to the detail of his own discoveries, he said the present state of knowledge was more likely to produce in him humility than exultation. The experimentalist was not the hero of his own tale, but he could not avoid being the subject of it; and he hoped the experiments and facts exhibited, would be considered independently of any opinion which he had divulged in connection with them. In the present imperfect state of enquiry, it would be presumption to expect that any thing would be permanently established. Alluding to the great powers of the voltaic battery*, he said, some might imagine that the desideratum of the alchemists was accomplished, and that the delusive hopes of those visionaries were, at length, realized: but it ought to be remembered there was an immense interval between the processes of combination and decomposition; that the proper province of chemistry extended but to inorganic matter; that in the powers of combination other agents were employed, with whose nature we were wholly unacquainted, and to whose operation we might for ever remain strangers.

Mr. Davy, having shown his experiments on the fixed alkalies, proceeded to ammonia, which, from the manipulations of Priestley and Steele, was regarded as a compound of hydrogen and nitrogen: he had no doubt, in his mind, that it contained also a portion of oxygen. This he attempted to demonstrate by experiments, particularly by passing some ammonia, in a state of gas, through a porcelain tube, heated to a white heat; the hydrogen and nitrogen were collected, and in the glass vessel through which they passed, moisture was very apparent, which he felt satisfied was water, formed by the oxygen contained in

* Mr. Davy's battery contains thirty-eight thousand square inches of metal plates.

the ammonia. Hence he inferred, that though oxygen had hitherto been considered as the acidifiable principle only, it would be found to be the alkalizing principle likewise.

From the alkalies he proceeded to the earths, which he enumerated and described, and which he considered as the link between the alkalies and metallic oxides; and he had no doubt that they would hereafter yield to some higher powers of the Voltaic battery, and exhibit the parts of which they were composed. On barytes he then made an experiment, showing very decisively that it contained an inflammable principle. He was next led to consider the phænomena of meteoric stones; and the light occasioned by them; Mr. Davy adds, were now perfectly explicable by the facts just discovered; but as to the place whence these bodies came, he gave no opinion, only that from the curves which they described, it was certain that they came from some other world, and were travellers only in our atmosphere; for if they had been formed there, their descent must be perpendicular to the surface of the earth, which, it was known, was not the case. The professor then referred to the several substances that had hitherto been deemed simple, supposing that all might, hereafter, be decomposed; in sulphur and charcoal, it was now known there was hydrogen; he seemed to suspect that the two great principles operating in nature, were the principle of inflammability and a metallic principle. It is our intention, in a subsequent number, to give a more detailed account of the discoveries of this learned chemist, which cannot fail to be highly interesting to every lover of science, and more particularly to those who, having attended the lectures at the Royal Institution, will be glad to have the facts and experiments there exhibited brought again to their recollection.

Med. & Phys. Journ. No. 113.

Jenite, a new Mineral.

M. le Lievre, a member of the National Institute of France, has discovered in the island of Elba a new mineral, to which he has given the name of Jenite, in honour of the battle of Jena. It is opaque, of a black colour, sometimes inclining to brown, and is nearly four times as heavy as distilled water. From the analysis of Messrs. Vauquelin and Descotils, it appears that this mineral contains rather more than half its weight of iron, mixed with a little manganese, and that the rest of the stone is lime and silex, the proportion of the silex being considerably more than double that of the lime.

Med. & Phys. Journ. No. 113.

Sensible Heat excited in Fluids by Agitation.

Dr. Joseph Reade has published an account of an experiment, the result of which is in direct contradiction to the received opinion, that the agitation or friction of fluids cannot excite sensible heat. It is as follows: the temperature of the apartment being 40°, half a pint of water, at a similar heat, was poured into a tin bottle-shaped vessel, into the aperture of which was inserted a thermometer surrounded with chamois leather, and made to fit accurately, with its bulb nearly in the axis. After briskly agitating the vessel for a few minutes, to his great surprise he found that the temperature of the water rose eight degrees; and, even after the apparatus was uncovered and laid at rest on the table, the water continued to rise for several minutes; proving the origin of the heat to be inherent in the fluid, and independent of any external causes. Anxious

to obviate every source of fallacy or objection, Dr. Reade prevented the communication of caloric by his hands, or of radiation from his body, by coating the tin vessel with many layers of woollen cloth carefully wrapped round it, over which there was a tin case, the entire nearly two inches in thickness, and covered externally with three wet towels. In the course of the experiment he dipped his hands frequently in snow water, and also sprinkled the towels. The Rev. Mr. Hincks, lecturer on chemistry in the Cork Institution, to whom the experiment was communicated, on repeating it in a glass bottle, found the heat of the vessel, by means of a thermometer placed between it and the covering, to be inferior to that of the enclosed fluid, and on a par with the atmosphere, which proves in a most satisfactory manner that there could be no communication of caloric from the hand.

Med. & Phys. Journ. No. 113.

Dupuytren's Experiments on Respiration, &c.

According to some cruel, though interesting, experiments reported to the French Institute, by M. Dupuytren, principal director of anatomy at the Medical School, and M. Duprey, professor at the Veterinary School at Alfort, on the subject of respiration; it appears, that the section of the two nerves of the eighth pair (those of the stomach and breast) in animals, is certain and instant death; and that respiration, the most important function of life, is exercised directly under the power of nervous influence, and is inseparable from it.

Med. & Phys. Journ. No. 113.

Prize Medals offered by the Humane Society of Philadelphia.

At a meeting of the managers, on the eighth instant, the decision of the medical professors of the University of Pennsylvania was received, containing information that they have carefully examined the three dissertations for the prize medals, and that " they are unanimously of opinion, that neither of them are entitled to the medals, as they do not appear to contain any *original* observations;" at the same time remarking, that they are by no means destitute of merit as to arrangement and style.

The managers adopted their decision, and are again induced to offer,

For the best dissertation on the means of restoring to life, persons apparently dead from drowning, *and more effectual than any yet in use*, a GOLD MEDAL, value ONE HUNDRED DOLLARS.

For the second best, a PIECE OF PLATE, value FIFTY DOLLARS.

The dissertations to be sent to the secretary of the society (post paid) by the first of January, 1810.

They may be written in the English, French, or Latin language; to be accompanied with a sealed paper, containing the author's name and place of residence, which is not to be opened unless the prize is decreed.

They shall be submitted to the judgment and decision of the medical professors of the University of Pennsylvania.

Although the first effort in this truly important research has not proved successful, yet, when we consider its magnitude, it is believed no additional reason need be given for continuing the attempt to enlarge our knowledge, where the preservation of human life is the object. We hope no discouragement will arise from the failure of the late dissertations, in which ingenuity and learning are evident, as our aim is *to arrive at a knowledge of the means of restoring life, more effectual than any yet in use;* being persuaded that the discovery of such means will amply repay the most laborious investigation, and form a new epoch in the progress of humanity and science.

By order of the Managers of the Humane Society,

JOSEPH CRUKSHANK, *President.*

ISAAC SNOWDEN, JUN. *Secretary.*

Philadelphia, June 15th, 1808.

University of Pennsylvania.

At a public commencement, held on the 28th of April last, the degree of doctor of medicine was conferred on the following gentlemen, after having defended the dissertations annexed to their respective names.

MASSACHUSETTS.

William Aspinwall, On Diabetes Mellitus.

NEW JERSEY.

Isaac H. Hampton, On Pneumonia.

Fitz R. Smith,	On the medical Properties of the Common Daffodil.
Isaac Todd,	On Thirst, and the advantages of abridging the Use of Diluents in Diseases which require Depletion.

PENNSYLVANIA.

William P. C. Barton,	On the Chemical Properties and Exhilarating Effects of the Nitrous Oxyde Gas; and its Application to Pneumatic Medicine.*
Samuel Benezet,	On the Cynanche Trachealis.
Samuel Betton, jun.	Observations made in two Voyages to India.
Samuel Colhoun,	On the Influence of Light in producing the Colours of Animal and Vegetable Bodies.
Matthew Cunningham,	On Local Inflammation.
John H. Davis,	On Lunar Influence.
George Fairlamb,	On Hepatitis.
Nathan Hays,	On the Manner in which Medicines act upon the Living System.
Isaac Heister,	An Historical and Philosophical Inquiry into Absorption; containing a Series of Arguments to prove the Absorption of Substances not Nutrient, whether applied externally or internally to the Human Body, as well as to that of some inferior Animals.
Samuel Humes,	On Dyspepsia.
Samuel Jackson,	An Essay on Suspended Animation.*
Charles Lukens,	An Essay on Fever.
J. B. Otto,	On Tetanus.
Robert Maskell Patterson,	In Proof of the Influence of the Moon in Diseases.
John Perkin,	On the Hydrocele.
George Poyntell,	On that Grade of Madness called Manalgia.
Samuel Stewart,	On Cuticular Absorption.
John D. Thomas,	On the Scrophulous Disease of the Hip-Joint.
John Wishart,	On Thyrocele (or Bronchocele).
Joseph Woollens, jun.	On Hydrocephalus Internus.

DELAWARE.

Henry Marim,	On the Influenza, as it appeared in the State of Delaware, in 1807: with some Observations on the Nature of the Disease.

MARYLAND.

John Arnest,	On Abscess.
Jacob Baer,	On Puerperal Fever.
Samuel Baker,	On the Form of Disease usually denominated Chorea Sancti Viti.
Michael A. Finley,	On the Use of the Muriatic Acid.
William Wilmott Hall,	Strictures on the Use of cold Water in the Cure of Fevers.
Arnold Hannenkampf,	On the Influenza.
James Page,	On Superfœtation.
William Pinkney,	On the Cholera Infantum.
William Kilty Smith,	On Mortification.
Thomas Worthington,	On the Modus Operandi of Medicines.

VIRGINIA.

Branch T. Archer,	On Cutaneous Absorption.
George Callaway,	An Experimental Inquiry into the Properties and Effects of the Juglans Cinerea.
Archibald B. Dick,	On the Pulse.
William Foushee, jun.	On Cynanche Trachealis
Robert O. Grayson,	An Investigation of the different Opinions in Favour of the contagious Nature of Remittent and Intermittent Fevers, together with an Inquiry into the Laws of Miasma, &c.
William Grayson,	On the Nourishment of the Fœtus in Utero.
Samuel Greenlee,	On the Advantages of Scepticism in the study and Improvement of Medicine.
Joseph Jones,	On Hepatitis.
Samuel Leake,	On Vision.
Robert Mayo,	On the Sensorium.*
Nathaniel Nelson, jun.	On Measles.
Philip C. Pope,	On the Nature and Treatment of Hypochondriasis.
Boanerges Roberts,	On the Medical Properties of a Species of Asclepias, or Swallow-wort.

Isaac A. Smith,	On the Virtues of Mineral Waters.
John Wilson,	On the Transfusion of the Blood.

SOUTH CAROLINA.

William Dicks,	On Tetanus.
Alexander Frazer,	An Attempt to prove that there is no definite period of Utero-Gestation in the Female of the Human Species.
James Haynsworth,	On the Yellow Fever, as it appeared in Charleston, in the year 1807.
Thomas Grimball Prioleau,	On the Aralia Spinosa.
Richard Shubrick,	On Menstruation.
Edmund H. Tucker,	On Cataract.

GEORGIA.

John Hunter Pope,	On the Vesiculæ Seminales.
Reuben S. Safold,	On the Influence of the Mind on the Body, in producing Diseases and Death.

IRELAND.

James Clarke,	On the Diurnal Revolutions of the Body.
Archibald M'Kinney,	An Essay on the Physiology of the Human Mind.

The dissertations marked with an asterisk * were published.

Lectures in Columbia College.

The annual medical lectures of Columbia College will commence on the second Monday of November next, and continue four months, during which the following courses will be given:

Anatomy and Surgery, by Wright Post, Esq.
Practice of Physic, and Chemical Lectures, by William Hammersley, M. D.
Institutes of Medicine, by John C. Osborn, M. D.
Materia Medica and Botany, by David Hosack, M. D.
Midwifery, by John R. B. Rogers, M. D.
Chemistry and Legal Medicine, by James S. Stringham, M. D.

P. S. In the botanical course for the winter, will be exhibited various specimens of indigenous and exotic plants, which will be preserved for that particular purpose; and a second course of botany will be given in the summer season.

Potash, a triple Compound.

Professor Davy, of the Royal Institution, Great Britain, has procured a peculiar metal, by transmitting the galvanic influence, from an apparatus containing nearly 40,000 square inches of surface, through moistened potash.

When this metal is exposed to atmospheric air, or comes in contact with water, it immediately takes fire, by combining with oxygen, and forms potash.

Had Mr. Davy made his experiments in atmospheric air confined by water or mercury, he probably might have found, that a part of the azotic, as well as oxygenous portion of the atmospheric air, was also absorbed.

The following experiment of Dr. Woodhouse seems to prove, that azote is one of the component parts of potash.

The doctor exposed two ounces of potash, mixed with an equal quantity of charcoal in powder, in a covered crucible, to the intense heat of an air furnace, for two hours.

When the mixture became cold, a small quantity of water was poured upon it, and it immediately took fire, and discharged a quantity of ammoniacal gas.

Now, as azote is one of the component parts of ammoniac, and as this base is not contained in either water or charcoal, Dr. Woodhouse concludes it must arise from the potash.

Extract of a letter from Dr. Louis Valentin, of Marseilles, to Dr. Rush, dated June 9th.

"Professor Joseph Frank, of Wilna, has published a retraction of Dr. Brown's system of medicine, which he once embraced with enthusiasm. He acknowledges the errors he fell into by following that system exclusively. This retraction does him great honour, and all our journals speak of it in very high terms."

Dr. Rush's new theory of the functions of the spleen and liver has been translated and published in the French language, with notes, by Dr. Louis Odier, professor of medicine at Geneva*.

* For an account of this theory, see Museum, Vol. 4.

CORRESPONDENCE.

The sincere pleasure I derive from being able to give extension to the defence of Dr. Hamm, against the charges brought forward (in the last number of this work, and extracted) from the Democratic Press, is counterbalanced, in some measure, by the regret I feel in having given publicity to the production. But having never seen any answer to it, which I could not have supposed would have been denied admittance into the publication which promulgated so serious a charge; I considered it a duty I owed to society to reprint it; and I now regard it as a duty still more sacred, and as an act of justice to Dr. Hamm, to insert the following letter, and the doctor's justification. EDITOR.

Dover, September 9th, 1808.

SIR,

HAVING observed, in the last number of the Medical Museum, an extract from the Democratic Press, prefaced with a few remarks of your own, on the introduction of the small-pox in Dover, by Dr. John Hamm, and feeling sensible of the injurious tendency such an unqualified misrepresentation is calculated to produce, in friendship to Dr. Hamm, and deference to the public, I take the liberty of stating my impressions upon the occasion, and of repelling the opprobrium which is attempted to be attached to his conduct, and which is so derogatory to his character as a gentleman, and so incompatible with his *dignity* and *humanity* as a *man*.

Presuming upon a belief of your respect for truth, candour, and impartiality, predicated upon your laudable exertions to disseminate a knowledge of medical science; I would not for a moment suppose that you would suffer the Medical Museum to become the vehicle of calumny, and to degenerate into an organ of personal recrimination: yet I cannot imagine that your liberality will deny to injured innocence an opportunity of *justification;* and I flatter myself that, as you are unquestionably the admirer of decorum, you will also become the *advocate of justice;* and by inserting the doctor's defence, which I here transmit you enclosed, you will thereby

place the question of *guilt at issue* before the high tribunal of public opinion.

I will just observe here, that so soon as the doctor noticed the extract in the Democratic Press, he forwarded one of his handbills to Mr. Binns for publication, But that gentleman, in the plenitude of his generosity, neglected to give it equal publicity with his extract from the Museum of Wilmington. You will perceive that the language of the doctor is severe, in consequence of the aggravated circumstances of the case; but the energy of his style is only borrowed from the unwarrantable virulence which characterized the acrimonious resolutions which were previously exhibited against him; and is such as he deemed proper for the vindication of his conduct in his own state, to the inhabitants of which he is generally known. Had Mr. Binns been actuated by the principles of justice, the necessity of my trespassing upon your attention would, in all probability, have been superseded; as you could not have given his spurious extract the formidable appearance it now wears, by being contained in the Medical Museum (from whence alone it assumes all its importance), without having, at the same time, in conformity with the dictates of an honest heart, given his answer also a place in your useful work; and which I now solicit you to do, or such part as you may deem essential to his justification. I will simply state, that many of the doctor's remarks were mere personalities, and only calculated for the meridian of Dover, where the transactions hinted at are intimately known to the citizens.

I will state one fact farther with regard to the small-pox. This disease had been introduced at Lewestown, from Philadelphia, in the adjoining county, which, necessarily, created considerable alarm; and, to appease the anxiety which was consequently excited, both physicians and people (having no confidence in vaccination there, as at Dover) introduced inoculation with ultimate unanimity. The contagion from Lewestown shortly spread over a great part of the county, and *justly* gave the inhabitants considerable uneasiness. However, I will forbear particularizing, as the doctor's publication will shield him from any apprehensions from the scrutiny of the learned, the candid, and the unprejudiced. But Mr. Binns had considered that the doctor had offended him some time before; they are antipodes in politics; he therefore gnashed his teeth in silent dudgeon until an opportunity occurred of treating him with this illiberality. Permit me, sir, to remark that your prefatory observations may tend to attach some odium to the character of Dr. Hamm, for his adopting the vari-

olous disease in *supposed preference* to vaccination; but that the contrary is the fact, I can assert from a personal knowledge.

I know that he did obtain the vaccine matter from Philadelphia, and, perhaps, from yourself, in order to benefit the general interests of society, and to secure the many who were endangered throughout the extent of a large and respectable practice; and, so far from his being an enemy to vaccination, I know him to be one of its ardent advocates. Dr. Hamm is known to be a gentleman highly respectable, and is a man of education and merit. As a medical practitioner, he is esteemed eminent, dignified, and indefatigable. Those who have a personal intimacy with Dr. Hamm, will warrant the assertion. They will also perceive, in the ungentlemanly and indecorous expressions which have been employed against him, other grounds, *in the general integrity of his conduct*, more objectionable to the enemies of candour, dignity, and truth, than that of the alleged introduction of the small-pox into Dover; and that from the receptacle of whose hearts the repository of malice has elicited the charge that, "*like a murderer he has a heart devoid of social duty, and fatally bent on mischief;*" and was at first given to the world with the gall-tipped *pen of falsehood and detraction.*

I have observed with pleasure that *Dr. Hamm has been one* of your *most intelligent medical correspondents;* and his patronage of your work will certainly merit the indulgence required. Then, sir, let me beg of you, *by the respect you bear for a science your joint* labours have united to improve, to insert his defence, together with his letter, in your next number.

Respectfully yours,

STEPHEN ALEXANDER.

Dr. J. R. Coxe.

P. S. The absence of Dr. Hamm, being in the western country, and my having been a student of his, has prompted me to this measure.

Should any difficulty occur to the publication required, or any explanation become necessary to your satisfaction, I pledge myself to remove every impediment which may be founded in propriety, and within the pale of possibility, upon your signifying the existence thereof, by addressing a letter to me in Dover, Delaware. S. A.

To the Editor of the Museum of Delaware.

Hinc justitiam discite, majestatem et non temere veritatis.

MR. JONES,

A publication, over the signatures of Joseph Harper and Cæsar R. Wilson, having made its appearance, a few days ago, in a folio handbill, wherein my conduct has been most wantonly assailed, regardless of the generosity of candour, or the dignity of truth; I feel impelled to urge, in reply, a few remarks, dedicated to justice, and to the calm suggestions of reason.

I mean not to offer a justification, so much as to invite investigation; and I will refer the reader to the publication itself for data; and my only postulatum is, that he may note the incongruity of arrangement, the tissue of inconsistencies, and the laboured zeal of malevolence and falsehood, which characterizes almost every feature of the resolutions. And, with truth, I might add, that the moon-calf publication itself, is a miniature of those characters whose prolific brains conceived, and whose untoward hearts gave birth to this prodigy of phrenzy, fallacy, and detraction.

———————*Crinemque rotantes*
Sanguineum populis ululârunt tristia Galli. LUCAN.

I now only have to premise that, but for some half dozen characters whose names have been artfully coupled with others in this unparalelled hydra of folly, this rattletrap of nonsense, I should not have had one solitary thought of injuring a fine-nibbed pen in rejoinder, or have stepped across the street to have arrested the mad career of those modern harpies, or of the Januses themselves; who, clothed with the armour of fancied omniscience, with pompous arrogance have ridiculously proscribed without mercy or deference to the decalogue.

You will perceive it is triumphantly asked "Why did he take the pains to procure matter to inoculate his brother's family?" Truly problematical indeed! And I will ask in my turn*, Why did fire burn papers? I claim your attention to part of the introductory resolution of the committee,

* Alluding to the returns for the election of governor having been destroyed by the person principally pointed at in this handbill.

" that by his obstinately persisting in his determination, unnecessarily, and without any cause whatever, to bring amongst us a dreadful disease, which the humane and benevolent of all parts of the world have, for years past, endeavoured to blot from the list of human calamities, he will deserve the indignation and contempt of the members of this meeting." Here you may observe both absurdity and falsehood; for, so far from persisting in inoculation after the first meeting, though actually applied to by several persons to be inoculated, that I did then, and have since, and do still, refuse to inoculate. But even had I continued inoculating, I should have been amply justified upon the inconsistent and partial principle expressed and adopted at the first meeting, wherein they suffered those affected with the measles, a more dangerous disease, to remain in town, notwithstanding Mr. Harrington, whose family were only now discovered to be slightly infected, voluntarily proffered, at the meeting, to remove them into the country. But further: the circumstance of the measles, supposed to be in town, was then made the ostensible ground for the rejection of the small-pox. It was then urged, with *perfect confidence*, by the FACULTY*, and carried, that the vaccine disease should be introduced. See the inconsistency! it was accordingly introduced. But, strange to tell, those very persons who adopted the resolution, afterwards unanimously resolved, that the *small-pox* should be immediately introduced, notwithstanding every one who was actually inoculated were now removed from town. " And for what purpose?" " Where was the necessity?" And I will ask, where was the necessity, eight years ago, for clandestinely inoculating a black woman in the leg, and thereby spreading " inconvenience, distress, and death?" Permit me to answer these interrogatories. It was " for the paltry consideration of fees." And who had these fees in consideration? And who had them in consideration eight years ago? Certainly not myself, for I did not practice here at that time; and, it is well known, at this time, that my practice, in this town, is not an object of consideration. Who then had them in " consideration?" Let the industry and agility which has been displayed upon the present momentous occasion answer the questions. It may, perhaps, be asked, why vaccination was not continued after its introduction? Let the question be solved by him who has discovered the most ardent itch for the " paltry consideration of fees." Or, I will solve it for him: because the cow-pox is not contagious, and therefore not so profitable. Look at this: " He requested A. Harris to keep the inoculation of his boy secret; who remonstrated with

* Meaning, ironically, only one person, Dr. Sykes.

him on the impropriety of his conduct in regard to his apprentice." It is false; it is impertinent. Quere, would it be amiss to issue instanter a "Breve de infecto variolis amovendo*," to oust the variolous disciples of Fabula from the town? Though, indeed, this identical "Breve de infecto variolis amovendo" has been as singularly engendered and as miraculously natalized as Milton's Sin from the brain of Lucifer!—And at this: "His servant was twice inoculated†." It is false also, it is maliciously false. Insidious perfidy! Humanity, how art thou degraded! But why may not those be now privileged to disregard the majesty of truth in gratification of malevolence, and in consideration of interest, who were privileged in 1802?—And at this: "He has a heart devoid of social duty, and fatally bent on mischief." Hold, vipers, hide the venom sting of malice. Who is it that is possessed of such a heart as here alluded to? Is it not those who would, like the midnight prowler, wish to rob the widow and the orphan? For observe this: "Did he not permit this same servant of his, knowing the disease to be upon him, to attend at a public house as ostler and waiter from Sunday till Saturday following, thereby putting in jeopardy the health, nay the lives of hundreds?" This—false in toto. But, even admitting it to be true, did they who advertised it regard "social duty," when by this single circumstance they basely attempted to dissever the means of support from the widow and the orphan? Who then is "fatally bent on mischief?" For I would humbly presume, that they only who would basely descend to pitiful misrepresentation, were "fatally bent on mischief." But it is not true that my servant had the eruption on him from Sunday till Saturday following; he had it not on Tuesday when I left town, and hither I did not return till Friday. Mark how a plain tale will put them down: their extreme liberality did not permit them to tell you that I was absent nearly four days; that when I left town his arm had not assumed the appearance of disease; that he had not been confined or indisposed an hour; that no one had been infected by him; and that so little danger was then and is now apprehended, that the family in which he lives does not think it necessary to become inoculated; and had it not been for the unanimous

* A new-fangled writ to expel diseases!! Had they not better issue a few "Breve de infecto variolis amovendo's" against agues, and to keep the *catadids* from singing?

† Doctor Morris unequivocally declares it to be his opinion, that my servant had been inoculated once only: he examined his arm several times, and I state this fact with his approbation.

resolution of the last town meeting, there would not now be a solitary case of small-pox in Dover. And where then was the necessity of passing such a resolution, when all those who were infected were sent out of town by the Cerberian " Breve de infecto variolis amovendo?" It is exultingly asked too, " Why this insidious covert conduct?" " Why give assurances which he knew were false?" To the first, I reply, that it is malicious. To the second, that it is false. Where is there a physician, of the least experience, who has not been deceived by the appearance of the punctured spot, and particularly in an African? I repeatedly requested two of the committee to examine his arm and judge for themselves, and not rely on my opinion. During my absence why did the committee not do so? I will tell you. It was wished by him, who always acts covertly and insidiously to gratify his passions, that he might remain and spread the disease, and thereby cover his designs and calumniate another. Or why take so much pains to procure matter? Whose conduct then, I ask, is " most covert and insidious;" he that recommended the vaccine and would not adhere to it, in order to gain time, but afterwards introduced the small-pox, or his who first candidly advised the propriety of inoculation, as the only means to quiet the minds of the people?

Having noticedt he most prominent absurdities of the handbill, I will close with a few observations, leaving the remainder, as a monument of folly, to that contempt which it merits.

You will observe that, in the first instance, I had been applied to, to inoculate, and that I could not have had the anxiety, as is represented, to do so in town, because I did refuse, on application, to inoculate several persons, who would inevitably have spread it. On the contrary, such was the anxiety, that one person inoculated himself! I had, early in March, inoculated several families in the neighbourhood. It may be proper to observe also, that I had previously procured vaccine matter, but the want of confidence in it in the circle of my patients, induced me to introduce the variolous disease. The same want of confidence existed at Lewes, and, it may be seen, exists here at this moment.

I now solicit my fellow-citizens, among whom I have many years lived in satisfaction, to throw aside opinions predicated upon prejudices, and take facts as they are. If I am wrong, blame me; but should they, upon cool and impartial inquiry and consideration, discover greater impropriety and heat of passion in the conduct of others, then, let the opprobrium attach where it is due. I cheerfully submit; Dies doceat.

JOHN HAMM.

Dover, April 15, 1808.